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Conference Abstract

Assessment of Biodiversity Data Collected Using iNaturalist Compiled Over Three Years of College Freshman Orientations

Robert D Stevenson‡, Carl L Merrill§, Peter R Burn§

‡ University of Massachusetts Boston, Boston, MA, United States of America
§ Suffolk University, Boston, United States of America

Corresponding author: Robert D Stevenson (robert.stevenson@umb.edu)

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Abstract

Each fall from 2017 to 2019, entering Honors students at the University of Massachusetts Boston were invited to attend a 2-day retreat on Thompson Island in Boston Harbor, Boston, Massachusetts, USA. As part of this retreat, students participated in a three-hour bioblitz using the iNaturalist platform. The educational goal of this exercise was to allow the students to observe nature and to participate in a Citizen Science project. These students were generally not science majors and had little or no experience with iNaturalist, and yet during 3 years they made over 2000 biodiversity observations, including over 5700 photographs. Using these data, we addressed the question, “Can naïve observers, using the iNaturalist platform, make useful contributions to our understanding of biodiversity?” For those unfamiliar with the iNaturalist platform, it facilitates this process by encouraging its online community of identifiers to provide species names, thus effectively integrating the collection and identification processes.

Observer training: A National Park Service educational team gave groups of 50 to 75 students a 20 to 30 minute introduction to bioblitzes, how to take pictures, especially close-ups with mobile phones, and how to use the iNaturalist app. The students then headed out in one- to four-person groups to preassigned quadrants of the island for 2 to 2.5 hours of observations.

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Evaluation of Observations: iNaturalist evaluates observations with a three category system of “Casual”, “Needs Id” and “Research Grade”. In addition to the iNaturalist ratings we evaluated other characteristics of the observations:

1. We tallied the number of photographs per observation and developed a rubric to score the quality of images as good, OK, or poor.
2. We identified whether or not the observer tried to identify the species being observed, and scored observations as to whether we thought an identification to species or genus was possible.
3. We totaled the number of observations that were identified to the species and genus level by August 1st, 2020.
4. Finally we evaluated the spatial quality of the observations.

Results: Over 50% of the observations were of plants and 40% of animals, mostly arthropods and mollusks. The remaining 10% were of fungi and seaweeds. A total of 202 unique species were identified from the student bioblitzes. The proportion of species common to each year was 19%. Forty-seven percent of the observations (945) were identified to species level but only 2/3 of these (687) were confirmed by others to make them “research grade”. Fifty-eight percent of the observations included three or four images, and 31% were judged to be of good quality, 54% OK and 15% poor. We thought that the majority of the observations were identifiable to species or genus level (64%), and in 26% of the observations, our expertise was insufficient to be confident of an identification. We scored the final 10% of the observations as unidentifiable. The location data for most of the observations met our expectations in that marine species were located on the periphery of the island and terrestrial species were found over land, concentrated along island pathways. However, we found about 2.7% of the observations did not make it into the official iNaturalist project because of errors in the GPS coordinates, sometimes placing the observation miles away. All observations were made on Thompson Island but 60 different place names were given for the 2000+ observations.

Discussion: A year-long biodiveristy inventory of the Boston Harbor Islands using the iNaturalist approach and completed in 2017 found 475 species. The 202 species identified (by students and identifiers) on Thompson Island are a signficant contribution considering the short, late summer sampling period. The short field experience with naïve observers contributes to the relatively low (19%) proportion of species in common among the three years. The students were predictably attracted to species that were easily photographed e.g., did not move or were of the right size. Examples include herbs and shrubs that were flowering or fruiting, oysters, mussels, snail shells, and insects such as butterflies. The instructors encouraged the students to take photographs of the whole organism and its parts, but some images were out of focus or did not capture details essential for identification. We expected that using GPS technology within miles of downtown Boston would lead to precise and accurate species locations and that was what we found. However, the errors associated with an observation can be large, and 2.7% of observations that should have been included in the project were initially not.

Conclusions: This bioblitz exercise was designed with an educational objective: to give college freshman from the city the opportunity to observe nature and partake in a citizen science project. We conclude that a short instruction period provided to naïve users armed with a digital native's expertise usingsmart phones allowed them to collect observations that the iNaturalist community of species identifiers was able to turn into quality biodiversity observations. The students' observations are building a record that can be mined by scientists to answer a variety of questions.

Keywords

citizen science, data quality, photo identification, crowdsourcing, bioblitz, naïve observers

Presenting author

Robert D Stevenson

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